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| 10/584,132 | 06/23/2006 | Peter Larsson | 4147-161 | 3878 |

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| EXAMINER | |
|---|---|
| PUENTE, EVA Y1 | |
| **ART UNIT** | **PAPER NUMBER** |
| 2611 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/584,132 | LARSSON, PETER | |
| | Examiner | Art Unit | |
| | EVA Y. PUENTE | 2611 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *38-74* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *38-45,49,50,54-63,67,68 and 72-74* is/are rejected.

7)☒ Claim(s) *46-48,51-53,64-66 and 69-71* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/23/06,12/12/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The abstract of the disclosure is objected to because language is lengthy and not precise. Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

### *Claim Objections*

2. Claim 43 is objected to because of the following informalities: on line 7, please delete “the step of” before “performing”.

3. Claim 44 is objected to because of the following informalities: on line 1, please delete “step of” before “performing”.

4. Claim 46 is objected to because of the following informalities: on line 4, please delete “the” before “step” and add --a --.

5. Claim 49 is objected to because of the following informalities: on line 1, please delete “step of” before “performing”.

6. Claim 52 is objected to because of the following informalities: (a) on line 2, please delete "the step of" before "performing". (b) on line 3, please add -- in a wireless communication network -- before "based on".

7. Claims 38 and 55 are objected to because of the following informalities: on line 11, please delete "signal information" and add -- said signal information in the wireless communication network -- after "jointly detecting".

8. Claim 70 is objected to because of the following informalities: on line 3, please add -- in a wireless communication network -- before "based on".

9. Claim 73 is objected to because of the following informalities: on line 8, please add -- in the wireless communication network -- after "signal information".

10. Claim 74 is objected to because of the following informalities: (a) on lines 6 and 8, please delete "complementary" before "soft". (b) on line 12, please add -- in the wireless communication network -- after "signal information". (c) on line 13, please delete "acquired" before "soft".

Appropriate correction is required.

## *Claim Rejections - 35 USC § 103*

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 73 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Den (US 2003/0053524) in view of Stewart et al (US 6,339,612).

a) Regarding to claim 73, Den discloses a network node (16 and 12 in Fig. 1) in a wireless communication network, said network node comprising:

means for collecting (18 in Fig. 1), from each one of a plurality of receiving nodes (base stations 12A, 12B, and 12C in Fig. 1), corresponding complex signal information produced from a superposition of signals received from a plurality of transmitting nodes (each base stations receiving and combing signals transmitted from mobile stations 16A, 16B and 16C. The base stations send complex signal streams to the central processor; abstract; [0025]); and

means for jointly detecting signal information (18 in Fig. 1 and 2; [0047-0048]) from said plurality of transmitting nodes (mobile stations 16A, 16B and 16C) based on the collected complex signal information (abstract, R1-Rm shown in Fig. 2) and a complex channel representation (complex channel estimates $C_{jk;}$ [0023]; $C_{11}$-$C_{MN}$ shown in Fig. 2) related to said plurality of receiving nodes (base stations 12A, 12B, and 12C) and said plurality of transmitting nodes (mobile stations 16A, 16B and 16C).

Den discloses send complex signal streams to the central processor, but does not explicitly teach the complex signal is in soft form.

However, Stewart et al disclose a CDMA communication system comprising a plurality of mobile stations (301 in Fig. 3) transmit signals to a base station (200). The base station samples and calculates channel estimation of the received signals. The channel estimation is converted in a soft form (DSP 320 in Fig. 3 and Fig. 4). The

detector (403 in Fig. 4) outputs the soft-decision symbol information for use in subsequent error control decoding (Col 3, L 33-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the soft decision information calculation of Stewart et al in each of the base stations of Den. Thus indicates that Den's base stations produce soft complex signal information. Subsequently, the soft complex signal information is forwarded to the central processor. One of ordinary skill in the art would be motivated to do so to reduce computation complexity and reduce cost in base stations.

b) Regarding to claim 74, (this claim is rejected based on the interpretation that "complementary soft complex signal information" is the same as "soft complex signal information", see Objection above).

Den discloses a network node (16 and 12 in Fig. 1) in a wireless communication network, said network node comprising:

means (base stations 12A, 12B, and 12C in Fig. 1) for converting a superposition of signals received from a plurality of transmitting nodes (each base stations receiving and combing signals transmitted from mobile stations 16A, 16B, and 16C) to produce complex signal information (abstract; [0025]);

means for collecting complex signal information (18 in Fig. 1 and 2; [0047-0048]) from at least one associated node (12A), each associated node producing complex signal information from a superposition of signals received from said plurality of transmitting nodes (base station 12A receive signals from mobile stations 16A, 16B, and 16C; [0015]); and

Means for jointly detecting signal information (18 in Fig. 1 and 2; [0047-0048]) based on complex signal information (abstract, R1-Rm shown in Fig. 2) and a complex channel representation (complex channel estimates $C_{jk;}$ [0023]; $C_{11}$-$C_{MN}$ shown in Fig. 2) related to the network node, each associated node and said plurality of transmitting node (Fig. 1).

Den discloses send complex signal streams to the central processor, but does not explicitly teach the complex signal is in soft form.

However, Stewart et al disclose a CDMA communication system comprising a plurality of mobile stations (301 in Fig. 3) transmit signals to a base station (200). The base station samples and calculates channel estimation of the received signals. The channel estimation is converted in a soft form (DSP 320 in Fig. 3 and Fig. 4). The detector (403 in Fig. 4) outputs the soft-decision symbol information for use in subsequent error control decoding (Col 3, L 33-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the soft decision information calculation of Stewart et al in each of the base stations of Den. Thus indicates that Den's base stations produce soft complex signal information. Subsequently, the soft complex signal information is forwarded to the central processor. One of ordinary skill in the art would be motivated to do so to reduce computation complexity and reduce cost in base stations.

13. Claims 38-42 and 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Den (US 2003/0053524) in view of Stewart et al (US 6,339,612), and further in view of Huusko (US 6,674,733).

a) Regarding to claim 38, Den discloses a method for detecting signal information in a wireless communication network having a number of nodes for communication (Fig. 1), said method comprising the steps of:

each of a plurality of receiving nodes (base stations 12A, 12B, and 12C in Fig. 1) converting a superposition of signals (each base stations receiving and combing signals transmitted from mobile stations) received from a plurality of transmitting nodes (mobile stations 16A, 16B, and 16C) to produce complex signal information (abstract; [0025]);

collecting complex signal information associated with said plurality of receiving nodes (central processor 18);

jointly detecting signal information from at least a subset of said plurality of transmitting nodes based on the collected complex signal information (18 in Fig. 2; [0047-0048]).

Den discloses send complex signal streams to the central processor, but does not explicitly teach the complex signal is in soft form. Den also does not explicitly teach collecting the soft complex signal over a transport network.

However, Stewart et al disclose a CDMA communication system comprising a plurality of mobile stations (301 in Fig. 3) transmit signals to a base station (200). The base station samples and calculates channel estimation of the received signals. The channel estimation is converted in a soft form (DSP 320 in Fig. 3 and Fig. 4). The

detector (403 in Fig. 4) outputs the soft-decision symbol information for use in subsequent error control decoding (Col 3, L 33-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the soft decision information calculation of Stewart et al in each of the base stations of Den. Thus indicates that Den's base stations produce soft complex signal information. Subsequently, the soft complex signal information is forwarded to the central processor. One of ordinary skill in the art would be motivated to do so to reduce computation complexity and reduce cost in base stations.

In addition, Huusko discloses a cellular radio access network (Fig. 2), wherein comprises mobile stations, base stations, radio network controller (RNC), and transport network (TN). The base stations are connection to RNC via TN for transport user data (Col 5, L19-25). This is well known and common network architecture. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the cellular radio access network of Huusko with the communication system of Den and Stewart et al. Thus indicates the central processor of Den collects the soft signal information over a transport network. One of ordinary skill in the art would be motivated to do so to facilitate wireless communication between mobile stations and base stations.

b) Regarding to claim 55, Den discloses a system for detecting signal information in a wireless communication network having a number of nodes for communication (Fig. 1), said method comprising the steps of:

a plurality of receiving nodes (base stations 12A, 12B, and 12C in Fig. 1), each

configured for converting a superposition of signals (each base stations receiving and combing signals transmitted from mobile stations) received from a plurality of transmitting nodes (mobile stations 16A, 16B, and 16C) to produce complex signal information (abstract; [0025]);

means for collecting complex signal information associated with said plurality of receiving nodes (central processor 18);

means for jointly detecting signal information from at least a subset of said plurality of transmitting nodes based on the collected complex signal information (18 in Fig. 2; [0047-0048]).

Den discloses send complex signal streams to the central processor, but does not explicitly teach the complex signal is in soft form. Den also does not explicitly teach collecting the soft complex signal over a transport network.

However, Stewart et al disclose a CDMA communication system comprising a plurality of mobile stations (301 in Fig. 3) transmit signals to a base station (200). The base station samples and calculates channel estimation of the received signals. The channel estimation is converted in a soft form (DSP 320 in Fig. 3 and Fig. 4). The detector (403 in Fig. 4) outputs the soft-decision symbol information for use in subsequent error control decoding (Col 3, L 33-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the soft decision information calculation of Stewart et al in each of the base stations of Den. Thus indicates that Den's base stations produce soft complex signal information. Subsequently, the soft complex signal information is forwarded to the central processor.

One of ordinary skill in the art would be motivated to do so to reduce computation complexity and reduce cost in base stations.

In addition, Huusko discloses a cellular radio access network (Fig. 2), wherein comprises mobile stations, base stations, radio network controller (RNC), and transport network (TN). The base stations are connection to RNC via TN for transport user data (Col 5, L19-25). This is well known and common network architecture. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the cellular radio access network of Huusko with the communication system of Den and Stewart et al. Thus indicates the central processor of Den collects the soft signal information over a transport network. One of ordinary skill in the art would be motivated to do so to facilitate wireless communication between mobile stations and base stations.

c) Regarding to claims 39 and 56, Den discloses wherein said step of jointly detecting signal information from at least a subset of said plurality of transmitting nodes is further based on a complex channel representation (complex channel estimates $C_{jk;}$ [0023] and shown in Fig. 2) related to said plurality of receiving nodes and said plurality of transmitting nodes (Fig. 1).

d) Regarding to claims 40 and 57, Den discloses complex channel estimates $C_{jk,}$ but did not explicitly disclose a complex channel gain matrix. However, it is well known channel estimator obtains channel gain. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to derive a channel gain

matrix from the channel estimation. One of ordinary skill in the art would be motivated to do so to calculate channel gain characteristics in a communication system.

e) Regarding to claim 41 and 58, Stewart et al discloses wherein said soft complex signal information retains phase and amplitude information (channel estimator 401 in Fig. 4 estimates phase and amplitude of received signals).

f) Regarding to claims 42 and 59, Den discloses wherein said soft complex signal information is collected from said plurality of receiving nodes (base stations 12A, 12B, and 12C in Fig. 1) in a central node (central processor 18), and said step of jointly detecting signal information is performed by the central node (central processor 18).

g) Regarding to claim 60, Den discloses wherein said wireless communication network is a cellular network (Fig. 1; [0001]), and said plurality of receiving nodes are base stations (12 in Fig. 1) and said plurality of transmitting nodes are mobile stations (16 in Fig. 1).

14. Claims 43-45, 49, 50, 61-63, and 67-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Den (US 2003/0053524) in view of Stewart et al (US 6,339,612), further in view of Huusko (US 6,674,733), and in further view of Toyryla et al (US 5,970,417).

a) Regarding to claims 43 and 61, Den discloses base stations and mobile stations, but does not explicitly disclose partition into multiple groups.

However, Toyryla et al disclose a cellular mobile radio system, wherein base stations (S1-S3) and mobile stations (MS1-MS4) are divided into multiple groups (k1,

K2, and K2 in Fig. 2) with an overlapping area. Each base station is connected to a system controller (TSC). The cellular mobile radio system eliminates the risk of a mobile station being registered to a wrong base station (Col 3, L8-17). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the interference cancellation system of Den in the cellular mobile radio system of Toyryla et al. Thus indicates partitioning the base stations and mobile stations of Den into multiple groups as described in Toyryla et al. The signal information determined by each base station in each group is send to the TSC of Toyryla et al. The TSC collect signal information from each group and perform joint detection. One of ordinary skill in the art would be motivated to do so to improve group call and eliminate interference from neighboring base stations in a cellular communication system.

b) Regarding to claims 44 and 62, Den discloses joint detection based on a complex channel representation related to the receiving nodes and at least a subset of the plurality of transmitting nodes (complex channel estimates $C_{jk;}$ [0023]; shown in Fig. 1 and 2). Toyryla et al disclose a cellular mobile radio system, wherein base stations (S1-S3) and mobile stations (MS1-MS4) are divided into multiple groups (k1, K2, and K2 in Fig. 2) with an overlapping area. Each base station is connected to a system controller (TSC). Combining the interference cancellation system of Den in the cellular mobile radio system of Toyryla et al., one of ordinary skill in the art would recognize that joint detection of each group is based on a complex channel representation related to the receiving nodes of the group and the transmitting nodes.

c) Regarding to claims 45 and 63, Toyryla et al disclose wherein at least two of said multiple groups are partially overlapping (K1-K3 in Fig. 2).

d) Regarding to claims 49 and 67, Toyryla et al disclose wherein said performing, for each group, joint detection is performed by a signal processing node associated with the group of receiving nodes (TSC in Fig. 2; Col 5, L13-18).

e) Regarding to claims 50 and 68, Toyryla et al disclose wherein said signal processing node is a designated receiving node that belongs to the corresponding group (K1-K3 and TSC in Fig. 2).

15. Claims 54 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Den (US 2003/0053524) in view of Stewart et al (US 6,339,612), further in view of Huusko (US 6,674,733), and in further view of Schneier et al (US 5,970,143).

a) Regarding to claims 54 and 72, Den, Stewart, and Huusko disclose all the subject matters above except for the specific teaching of compressing signal information on the receiving node and decompressing the signal information before joint detection.

However, Schneier et al disclose a communication system comprising a computer (14 in Fig. 1A) and a central computer (12), wherein data is compressed by the computer device (14) and decompressed in the central computer (12; Col 24, L20-24). The computer device is interpreted as the receiving node, while the central computer is interpreted as the central processor. Data compressing and decompressing is well known algorithm in signal processing. Therefore, it would have been obvious to one of ordinary skill in the art at time of invention was made to combine the data

compressing/compressor of Schneier et al in the receiving node of Den and data decompressing/decompressor of Schneier et al in the central processor of Den. Thus indicates compressing signal information on the receiving node; collecting the compressed signal information over a transport network; and decompressing the signal information before joint detection. One of ordinary skill in the art would be motivated to do so to provide data coding/decoding and reduce resource consumption in a communication system.

### *Allowable Subject Matter*

16. Claims 46-48, 51-53, 64-66, and 69-71 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome objection indicated above and in independent form including all of the limitations of the base claim and any intervening claims.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Y Puente whose telephone number is 571-272-3049. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 18, 2009

/EVA Y PUENTE/
Examiner, Art Unit 2611